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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/575,472	04/12/2006	Francois Pierre Michel Cansell	065691-0439	3228

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EXAMINER	
WIESE, NOAH S	

ART UNIT	PAPER NUMBER
1793	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/575,472	CANSELL ET AL.	
	Examiner	Art Unit	
	NOAH S. WIESE	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 April 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 3-23* is/are pending in the application.

4a) Of the above claim(s) *16-20* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-15 and 21-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Status of Application

1. Acknowledgement is made of amendments filed 04/14/2008. Upon entering the amendments, claim 2 is canceled, claims 1 and 11 are amended, and the claim 23 is added.

2. The claims 16-20 are withdrawn from consideration, and claims 1, 3-15, and 21-23 are pending and presented for the examination.

Objections Withdrawn

3. Claim 11 been amended to overcome the objections set forth in the previous office action. Therefore, the objections to the claims have been withdrawn.

Applicant's Arguments

4. Applicant's arguments filed 04/14/2008 have been fully considered but are not persuasive.

Applicant argues that the method taught by Chen uses pH to control precipitation and that pressure is not used as a control parameter, and therefore concludes that controlling the pressure of the solution would not provide any improvement in the coating process of Chen. However, this conclusion does not follow from the premise set forth. The fact that Chen does not contemplate using a supercritical fluid to assist in precision precipitation of the ceramic precursor does not mean that doing so would not constitute an improvement on the process, and that one of ordinary skill would not recognize this improvement. Depositing a precursor from a solution into ceramic pores is an equivalent

physical process to precursor deposition onto ceramic particles. Precise control of the deposition would clearly be advantageous in both circumstances, and one of ordinary skill in the art would have recognized these advantages. Therefore applicant's assertion that using supercritical fluid for precipitation would not lead to improvements is not convincing, and thus the previously issued rationale for obviousness is maintained.

Applicant further argues that using a supercritical fluid would not be a substitution of one known element for another for predictable results. Applicant argues that Berneburg uses supercritical fluid to infiltrate a ceramic body and that Berneburg does not teach that the supercritical fluid improves precipitation. This is false. Berneburg teaches that the solubility of the supercritical fluid can be controlled to control the precipitation (deposition) of the ceramic precursor contained therein (see Abstract and example 1). These teachings show that the use of supercritical fluids for carrying the ceramic precursor to be deposited leads to the ability to control the rate of precipitation through the control of the solubility. This would be advantageous both when depositing precursor in ceramic pores and when depositing precursor on ceramic particles such as in a sol-gel method.

Applicant argues that in the Berneburg method there is no chemical reaction between the precursor and the ceramic body and that in the Chen method there is a reaction to form silica on the ceramic particles. However, the presence of lack of a chemical reaction between the precursor and the substrate would not affect the motivation to use the supercritical fluid. The advantageous of

solubility control would be present whether or not the precursor was meant to react upon deposition.

Applicant further argues that in the Chen method, there is no need for infiltration because the particles are mixed in a sol. However, the ability to control precipitation of the precursor from the solution would be advantageous in this process, whether or not infiltration was needed.

For the above reasons, applicant's argument that using a supercritical fluid in place of an ambient fluid would not be a case of substitution of one known element for another to obtain predictable results are not convincing. Thus, the rationale for modification given previously is maintained. The previous rejection of claims 3, 6, 12, and 21, under 103(a) over Chen et al in view of Berneburg is maintained. Applicant's amendments to the independent claim 1 distinguish the claim and its dependent claims 2, 4-5, 7-11, and 13-15 over Chen et al. Therefore, a new ground of rejection is necessitated by amendment.

New Grounds of Rejection

5. Claims 1, 4-5 7-11, and 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al (Structure, sintering behavior and dielectric properties…) in view of Berneburg et al (US 4552786).

Regarding **claim 1**, as discussed in the previous office action, Chen et al teaches a method of coating barium titanate powder (a ferroelectric) with silica (a dielectric material) (see Abstract). Chen does not teach a minimum pressure for the fluid containing the dielectric precursor. However, as discussed in the previous office action and in greater detail above, it would have been obvious to

one of ordinary skill in the art to modify Chen in view of Berneburg in order to carry out the Chen process with a supercritical fluid. Chen teaches an aqueous solution of the dielectric precursor, and a supercritical water solution is at a pressure well above 10 bar. Therefore, the obvious modification of Chen et al in view of Berneburg et al would lead to a process meeting all of the limitations of the newly amended claim 1. Thus, the claim is obvious and not patentably distinct over the prior art of record.

Regarding **claim 4**, Chen et al teaches that the $BaTiO_3$ powders were synthesized by oxalate coprecipitation (see page 315, left column). As stated previously, the vague limitation that the process is carried out "under pressure" can be met by the assumption that the coprecipitation was carried out at atmospheric pressure.

Regarding **claims 7-8**, Chen et al teaches that the ferroelectric material that is coated is $BaTiO_3$ (see Abstract).

Regarding **claims 9-10**, Chen et al teaches that the dielectric compound coated on the barium titanate is silica, which is another name for SiO_2 (see Abstract).

Regarding **claim 11**, Chen et al teaches that the dielectric precursor is water glass, Na_2SiO_3. This is a Na-salt (see page 315, left column and page 316, left column).

Regarding **claim 13**, Chen teaches that the solvent used is water (see page 316, left column).

Regarding **claim 14**, Chen et al teaches that the $BaTiO_3$ particles are about 110-130 nm (see page 315, left column.

Regarding **claim 15**, Chen et al teaches that the silica film on the surface of the powder is about 5 nm (see Abstract).

6. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al (Structure, sintering behavior and dielectric properties…) in view of Berneburg et al (US 4552786) and Stangle et al (US 5523065).

Regarding **claim 23**, the claim differs from Chen in view of Berneburg because Chen and Berneburg do not teach a precursor that is an acetate, acetyacetonate, or alkoxide. However, the use of these precursors in coating silica onto barium titanate was known in the art at the time the invention was filed.

Stangle et al teaches a method for producing and coating barium titanate particles. After production of the particles, they can be coated with a transition metal compound that can be an acetate (see claim 11). The teachings of Stangle show that the use of an acetate precursor for coating barium titanate particles was known in the art at the time the invention was filed. Even though the coating method in the Stangle patent is somewhat different than that of the Chen document, one of ordinary skill would have understood that the acetate precursor could be used in the Chen method because the underlying physical process of coating is the same in both methods. One of ordinary skill would have been motivated to use the acetate precursor in place of the salt precursor taught by Chen because Stangle teaches that the acetate of the coating metal is soluble in

the preferred solvent and is capable of being precipitated and being converted to the oxide (see column 8, lines 53-63). Thus Stangle shows that the acetate of silica would be a good precursor candidate, and thus one of ordinary skill would have had motivation to substitute one silica precursor for an equivalent precursor in order to obtain expected, equivalent results. Therefore, claim 23 is obvious and not patentably distinct over the prior art of record.

Previous Art Rejections

7. Claims 3, 6, 12, and 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al (Structure, sintering behavior and dielectric properties...) in view of Berneburg et al (US 4552786).

Regarding **claims 3, 6, and 21-22**, the claims differ from Chen et al because Chen does not teach that the coating fluid is kept under supercritical conditions or that the synthesis of the ferroelectric material is carried out under supercritical conditions. However, it would have been obvious to one of ordinary skill in the art at the time that the invention was filed to modify Chen et al in view of Berneburg et al in order to obtain a method of using a precursor-containing liquid kept under supercritical conditions. This modification would have also motivated one to use supercritical conditions when producing $BaTiO_3$ by coprecipitation.

Berneburg et al teaches a method of infiltrating a porous ceramic with a fluid containing a solvent and the precursor to a ceramic. The fluid is kept under supercritical conditions to enhance infiltration and precipitation of the ceramic into the pores (see Abstract). This method could also be used to infiltrate a fluid

containing a solvent and precursor into a ceramic powder. Both a porous ceramic and a ceramic powder have spaces between the areas of solid ceramic, so the same method could be used to achieve the desired effect, which is to fill the spaces with the precursor liquid. Therefore it would have been obvious to one of ordinary skill in the art to modify the method taught by Chen et al with the method and supercritical conditions taught by Berneburg et al.

Berneburg also teaches that the use of supercritical fluids containing ceramic precursors have great potential utility in the processing of ceramic materials. This is due to the fine control of solubility when the fluids are in the supercritical condition (see column 2, lines 32-47). Such control would obviously be beneficial when performing coprecipitation synthesis, such as is carried out by Chen et al to produce $BaTiO_3$. Thus, the modification of Chen et al with Berneburg et al would have motivated one to use supercritical processing conditions in both the synthesis and coating of the ferroelectric.

One would have been motivated to make this modification because Berneburg et al teaches that the supercritical conditions for the fluid enhance the infiltration, and this would be a desired effect when infiltrating a fluid into a powder to coat said powder. One would have expected reasonable success in such a modification because, as stated above, porous ceramics and ceramic powders can be considered analogous for the purposes of infiltrating fluid because they are both ceramic bodies separated by spaces to be filled. Therefore, no detrimental effects would be expected by using supercritical

conditions with fluid containing the solvent and precursor. Claims 3, 6, 21, and 22 are obvious and not patentably distinct over the prior art of record.

Regarding **claim 12**, Chen et al does not teach either of these substances as potential solvents. However, these substances are well known for their use as solvents under supercritical conditions. Berneburg et al teaches that CO_2 can be used as the solvent in the infiltration process (see Claim 2). When modifying Chen et al in Berneburg et al as discussed above, one would have been motivated to use the CO_2 solvent taught by Berneburg under the modified supercritical conditions. Therefore, claim 12 is obvious and not patentably distinct over the prior art of record.

Conclusion

8. All the pending claims are rejected.

9. Applicant's arguments are not persuasive, and the new grounds of rejection are necessitated by amendment. Therefore, **THIS ACTION IS MADE FINAL.**

10. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will

the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to NOAH S. WIESE whose telephone number is (571)270-3596. The examiner can normally be reached on Monday-Friday, 7:30am-5:00pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jerry Lorengo can be reached on 571-272-1233. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jerry A Lorengo/
Supervisory Patent Examiner, Art Unit 1793

Noah Wiese

June 30th, 2008
AU 1793